

HINTS ON

The Production and Handling of

Malting Barley

in Western Canada



By

CANADA MALTING CO. LIMITED

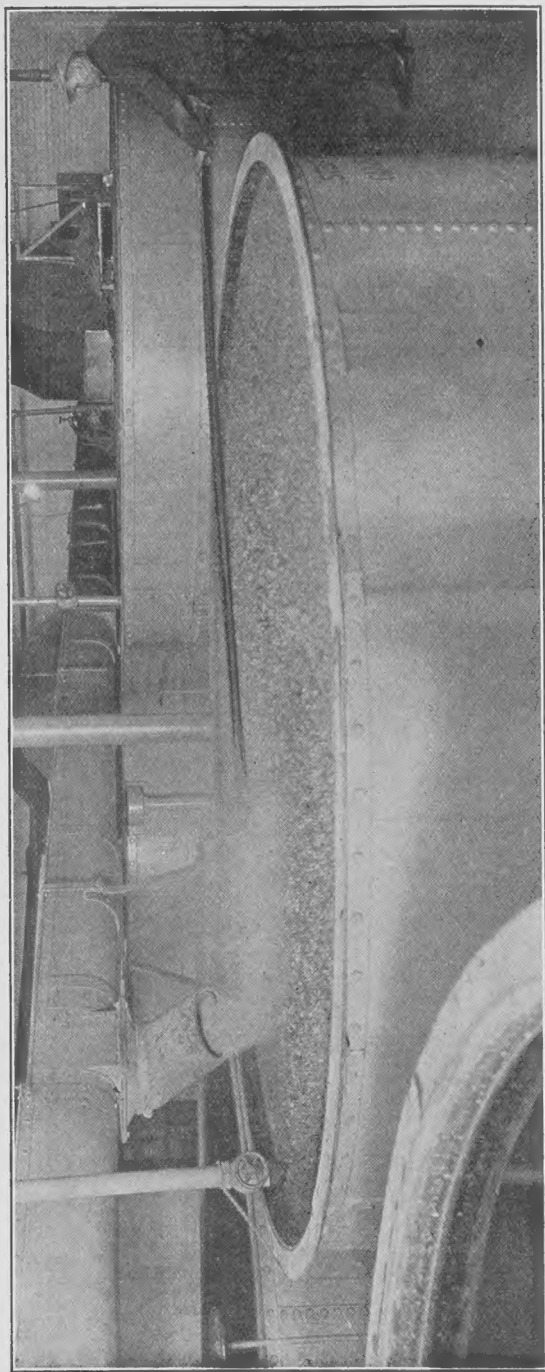
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STEEL ROOM SHOWING STEEP OF BARLEY RUNNING INTO TUB WITH SKIMMERS ON TOP.

INTRODUCTION

With recent development of the malting industry in Canada, there has naturally occurred a revival of interest in the production of a class of barley with which to satisfy the requirements of this trade and for which a market preference is always expressed in the form of a premium over the price of lower grade material of feed standards.

Apart from this, other important considerations of both an economic and agronomic nature are, at the present time, tending to focus the attention of leading farmers and educational workers on the pure barley crop as a means of improvement or relief.

Appreciating these facts and at the same time realizing that, in recent years, the same interest has perhaps not been devoted to the growing of superior barley as to high class wheat and other grains, it is hoped that this booklet may serve a useful purpose.

Illustrations in this booklet were made at the Montreal plant of Canada Malting Co. Limited.

Malt and the Malting Process

Perhaps the best way of understanding the requirements of malting barley would be to first consider the finished product, **malt**. In appearance, barley malt resembles barley very much because the outer covering of the original barley kernel is not changed to any extent by the malting process. The inside of the kernel, however, is changed, by malting, from its natural condition in important respects. The principal physical change is to be found in the friable or crisp nature of the malt as compared with barley and in the ease with which it can be crumbled into a **white floury** mass. This shows that, in malting, the starch of the barley has been put into a freer or more available form than in the original grain. Hence, the main purpose of malting is to produce from barley the greatest possible volume of starch in a free condition.

In the manufacture of malt from barley, the first step is the careful cleaning of the grain if the same has been received in the rough. In this process there is removed as much of the impurities as possible with modern machinery, such as weed seeds and seeds of other cultivated crops.

Having been cleaned, the barley is then placed in large steep tubs, in running water, where it is allowed to remain for two or three days. From the steep tubs it is conveyed to the germinating compartments where ideal conditions are provided for the germination process to go on. These compartments are equipped to handle from 2,000 to 3,000 bushels at a time. In them the moist, clean barley is turned and watered regularly by mechanical means while, at the same time, it is being fed with a steady current of fresh, washed air, the

temperature of which is under absolute control day and night and throughout the seasons of the year.

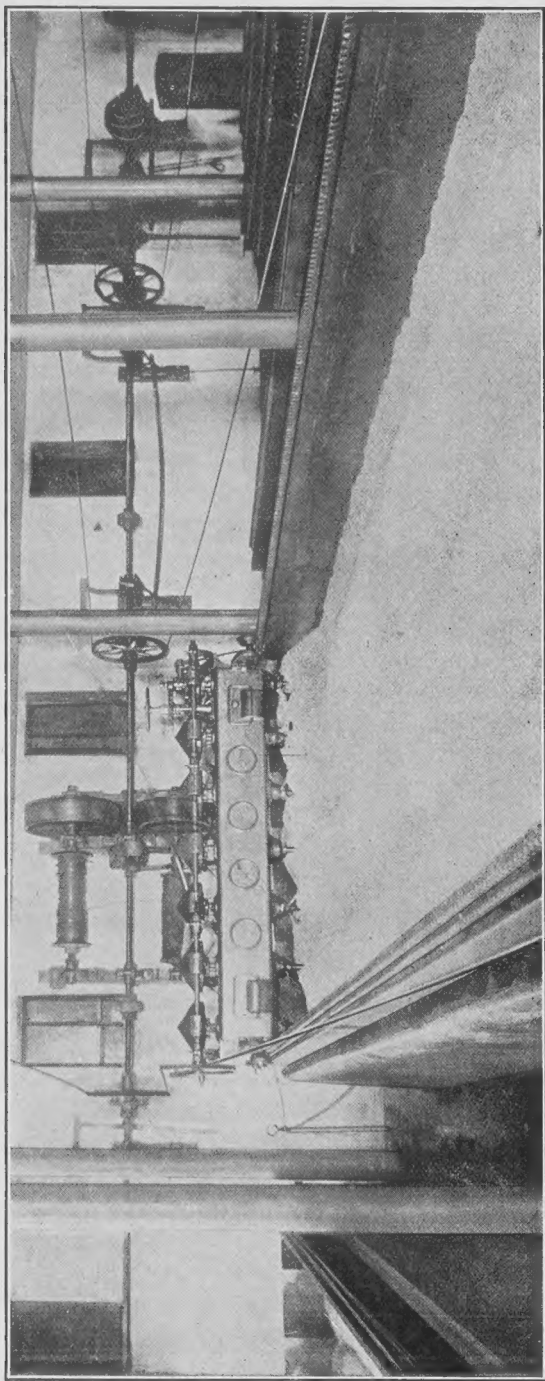
After germination has proceeded sufficiently in the compartments the sprouted barley is elevated to the kilns where it is thoroughly dried. After drying, it is again put through a cleaner to remove the sprouts, and then it is ready for market.

Malting Barley

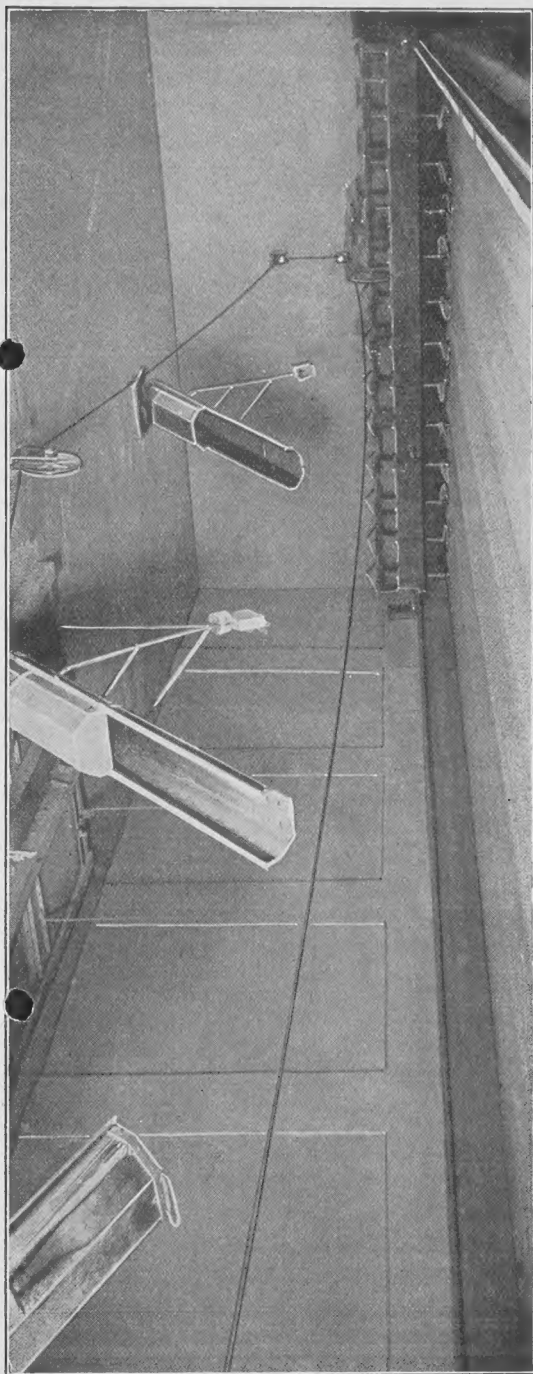
Production and Handling.

RIPENING

From the purpose of malting, as already stated, it will be obvious that the barley best suited for making malt is the barley that when malted will yield the greatest possible volume of free starch. As starch development is an important function of the ripening process in the field, it therefore follows that, for malting, a barley crop must be uniformly and well ripened. If cut on the green side, there is a sacrifice of starch content, a proportion of which remains in a partially developed condition in which it is hard to reduce to the proper degree of friability when malted. Unlike other grain crops, such as oats and wheat, which are able to continue their filling process for some time after being cut, barley ceases to develop its grain any further once the connection between the root and head has been broken. In order to ensure proper ripening of the crop, early seeding is essential. Authorities advise the seeding of barley intended for the malting market about one week after the land has opened up and wheat seeding has started. Barley sowing can be, of course, carried on later than wheat sowing but it is usually the case that the better quality barley comes from the earlier seeded crops. Many



VIEW OF TERMINATING COMPARTMENT, SHOWING TURNING MACHINE IN ACTION.



VIEW OF TOP KILN FLOOR, SHOWING TURNING MACHINE AND LOADING SPOUTS.

experienced growers of malting barley make a practice of delaying cutting for some time after their barley appears to be ripe in order to ensure thorough filling of the grain.

Freedom from Mixture of Other Grains

The utility of otherwise good malting barley is often seriously impaired by the presence in it of other grains. The worst offender in this respect is wheat, which on account of its similarity to barley in shape, weight and size cannot be separated thoroughly. The remedy for this condition lies in the hands of the producer and resolves itself into a matter of paying some special attention to the seed and the land to be used. The seed should be as free from other grains as possible and the danger of having volunteer grains, other than barley in the crop should be considered and obviated to the greatest possible extent, by the use of clean land.

VARIETY

It has been found that barleys of different varieties show more or less variation in their suitability for making malt, and after very careful testing over a period of years the following conclusions have been arrived at:

1. Generally speaking, the chances of obtaining satisfactory malting results from a two-rowed barley are much less than in the case of the six-rowed type.
2. Six-rowed varieties can be grown successfully for malting purposes over a much wider range of soil and climatic conditions than the two-rowed varieties.
3. Under indifferent management, cultural and climatic conditions, two-rowed barleys rarely or never succeed in attaining the development which is essential for their conversion into satisfactory malt, whereas, under similar conditions, the six-rowed barleys may often prove fairly suitable for malting purposes.

The standard variety of malting barley for the Dominion at present is the well-known O.A.C. 21, the history of which is familiar to everyone associated with the agriculture of Canada.

GERMINATION

In addition to the factors of maturity, purity and variety, as covered in the foregoing paragraphs, the other main essentials of a good malting barley are connected with that most fundamental of all malting operations—**germination**. To make satisfactory malt, it is essential that barley germinate nearly 100% in a given time. Every grain that does not germinate does its part to influence adversely the quality of the malt from the whole compartment concerned. Germination must be uniform because it is not feasible to hold back in process a unit of 2,000 to 3,000 bushels and so disrupt the whole sequence of a large factory in order to wait for a proportion of "late-comers." Nor is it possible to take off a batch of this size to accommodate some "early birds." In either case there is a definite financial loss to the maltster and a danger of losing his reputation.

The indications of good germination in a malting barley are:

1. Soundness and reasonable brightness—not showing the effects of heating, weathering, sprouting or freezing.
2. Freedom from skinned and broken kernels.
3. Uniformity of kernel with the greatest possible degree of plumpness.

A few suggestions as to ways and means of attaining these desirable factors in the growing and handling of malting barley may not be considered out of place here.

HARVESTING AND THRESHING

Soundness and brightness are factors in the control of which a great part is played by

weather conditions at time of harvesting. It would seem, however, that even under adverse weather conditions of a like degree, and given the same opportunities in other respects, certain growers do succeed in producing a fair malting barley while others may fail to turn out even presentable feed barley. The difference would appear to be mostly a matter of management. As the barley germ is particularly sensitive to frost, it follows that barley, in order to qualify for the malting market, must be practically free from frost damage. This emphasises the wisdom of early seeding of the crop. In order to be on the safe side, regardless of weather probabilities, the long stook of about 8 to 10 sheaves is recommended in preference to the round stook. In the event of wet weather occurring, the former type of stook provides for quicker and more thorough drying of the sheaves than the latter. It is also a good practice to provide for the protection of the stooks by using an extra sheaf for a cap. The cap sheaves to be thrown to one side at time of hauling and later hauled and threshed separately.

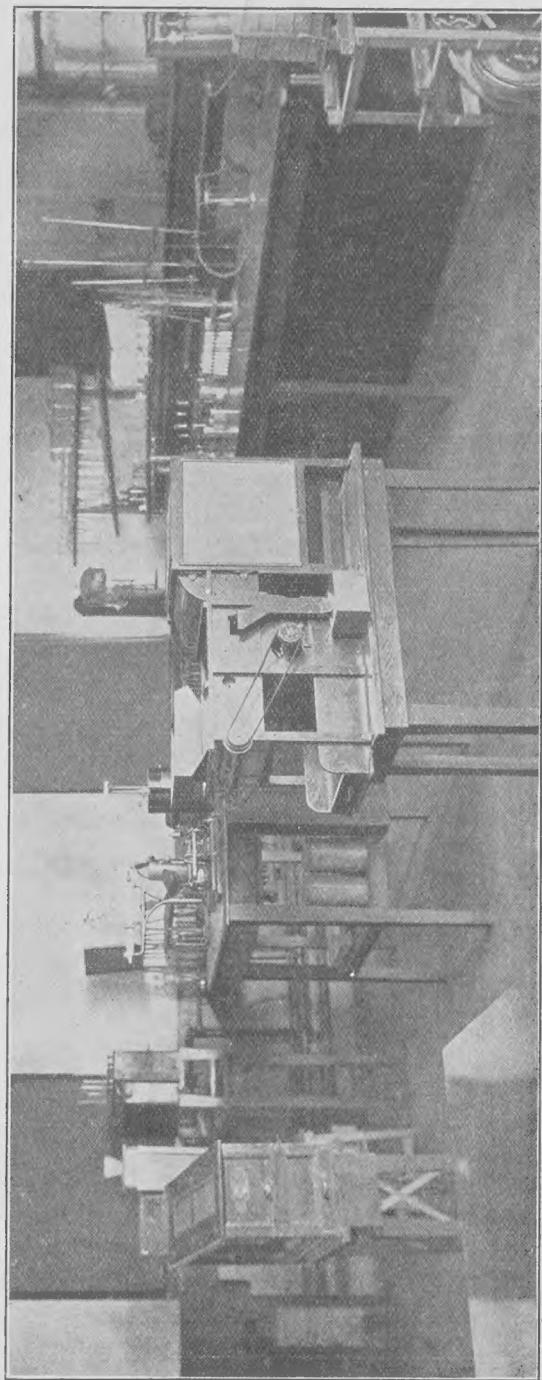
In the event of barley having been threshed while still somewhat damp or tough, it should be given the best possible chance of drying out in shallow bins where it will not be so likely to heat.

The presence of skinned and broken kernels in barley intended for malting can be avoided by careful threshing. It is far better to have barley for the malting market come from the separator looking a little "tailey" and "ragged" and undamaged than looking quite trim and having every tenth kernel skinned or broken. In the event of damage such as aforementioned being observed at the time of threshing barley, the remedy lies in removal of a proportion of the concave teeth of the separator, and the lowering of the remainder to a point where damage to the grain ceases.

Uniformity and plumpness of kernel in a barley or other grain crop is dependent upon many factors, one of the chief of which is the quality of seed used. It is only from well-cleaned, well-graded seed that is pure and true to variety that one can hope to produce crops of barley which will meet with favour at the hands of the maltster.

SUMMARY

1. The malting process consists of cleaning, steeping, germinating and drying the sprouted barley in kilns.
2. The main object of malting is to release the starch content of the barley kernels.
3. Only ripe barley will make good malt; unripe barley is seriously objectionable. Satisfactory ripening depends considerably on early seeding.
4. A mixture of other grains in malting barley can and should be avoided by the use of pure seed on clean land.
5. O. A. C. 21 is the standard malting variety at present.
6. High and uniform germinating power is a vital necessity in malting barley.
7. To germinate and grow satisfactorily, barley must be:
 - (a) Sound and bright;
 - (b) Free from damaged kernels;
 - (c) Plump and uniform.
8. Careful harvesting will help ensure soundness and brightness. Early seeding is a good precaution against frost damage.
9. Careful threshing will avoid damaged kernels.
10. Plumpness and uniformity can be attained by the use of good seed, coupled with sound cultural practices.



SECTION OF BARLEY AND MALT TESTING AND RESEARCH LABORATORY.